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MCZ newsletter

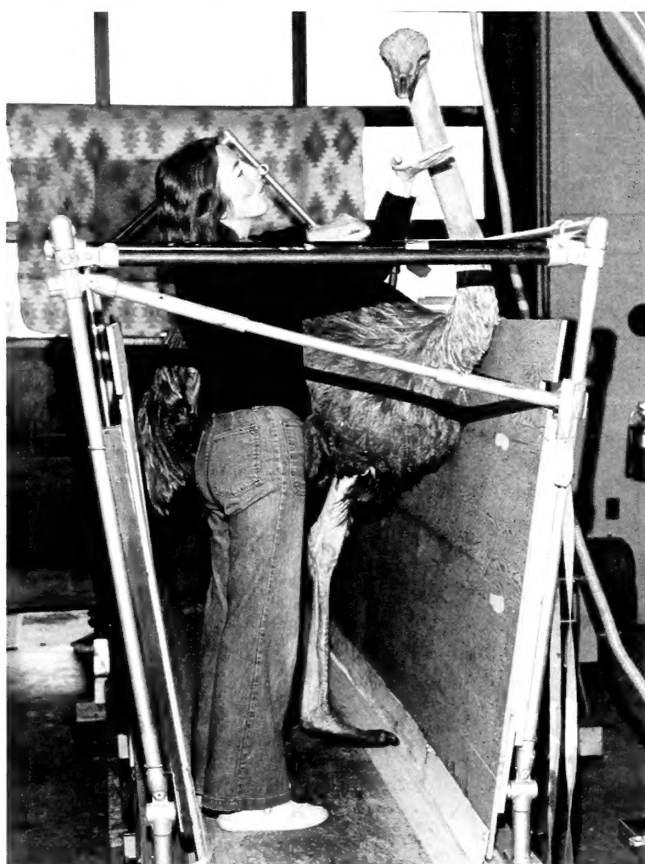
MUSEUM OF COMPARATIVE ZOOLOGY

Philip J. Darlington, Jr.

ANIMALS ON THE GO AT CONCORD FIELD STATION

Running, both in circles and in place, keeps many of the animals and their handlers busy at the Concord Field Station. Answers to questions on locomotion, thermal regulation, energy consumption, and the causes of arthritis are emerging from all this activity.

For some research, however, it is more convenient to go where the animals live than to bring them to the Field Station. Professor C. Richard Taylor will transfer



Dr. Sheila Mahoney prepares "Big Bird" the ostrich for a run on the specially-constructed treadmill. He needs some visual coaxing, which involves researchers running in front of him to demonstrate, in order to work up to a good trot. Dr. Mahoney, an NSF Postdoctoral Fellow, is interested in heat adaptation of birds and mammals of varying sizes.



Going round in circles is a daily routine for these sheep who are part of Dr. Eric Radin's NIH-funded study of the causes of arthritis. In this picture the sheep are running on the outer concrete track of a circular wooden structure; the inner track is dirt. The effects of running on different surfaces are compared. A motorized revolving arm encourages the sheep to keep moving.

his research activities to East Africa this winter, with the aid of grants from the National Geographic Society, the Guggenheim Foundation, the National Science Foundation, and the hospitality of colleague Dr. Geoffrey Maloiy, head of the Department of Animal Physiology at the University of Nairobi. Having already measured the energy cost of locomotion and the relation of stride gait to weight in lions, horses and dogs in the United States, and desert gazelles in Israel, Dr. Taylor, together with graduate students Howard J. Seeherman and Norman C. Heglund, will now run rhinos, elephants, giraffes, and wildebeasts in Kenya. Plans call for marking off a grid on a large flat area of land, mounting a high speed camera at a stationary point, and filming the animals as they are chased across the grid with field vehicles. These studies will provide field data to verify results obtained from animals running on a treadmill in the laboratory.

VISITORS

... from New Haven

Dr. Catherine Skinner, Alexander Agassiz Visiting Professor for the Fall term, brings a background in geology to bear on her study of the mineralization of tissues in bones and teeth.

On leave from Yale's Department of Surgery, where she has been teaching medical students since 1967, Dr. Skinner welcomes this opportunity to teach a course on *Biology of Bone* and to work on a study of bone growth rate in a series of animals. She is greatly aided in this work by the fact that tetracycline, a widely prescribed antibiotic, sequesters in bone forming a fluorescent label. It is therefore possible to date the injection of tetracycline into the live animal on excised tissues.

Coming to the MCZ is like coming "home" to Dr. Skinner. She received her Masters degree from Radcliffe before marrying an Australian fellow student (Brian Skinner, Eugene Higgins Professor of Geology at Yale who, incidentally, was the first Fulbright scholar in 1950) and completing her Ph.D. at his home university of Adelaide.

... and New Zealand

The MCZ's Invertebrate Department has been host to New Zealand zoologists Dr. Raymond R. and Mrs. Lyndsay M. Forster since April. Dr. Forster, who is the director of the Otago Museum in Dunedin, came to study spiders and work with some of the hitherto unstudied material collected by Professor *emeritus* Philip J. Darlington, Jr. in Chile in 1962. Mrs. Forster has continued her research on the amazing visual acuity of jumping spiders. These specific inquiries are adding significantly to the total picture of the zoogeography of New Zealand, a lifetime study for the Forsters.

At the Fall's first Natural History Seminar, Dr. Forster, who noted that he had also launched the first seminar in this series while spending a year at Harvard as a Fulbright Research Scholar exactly twenty years ago, gave an overview of the



Dr. Catherine Skinner with ultra violet light box which causes tissues injected with tetracycline to fluoresce.



Dr. and Mrs. Forster

flora and fauna of New Zealand and the southern hemisphere. As Dr. Forster pointed out,

"New Zealand is significant to the notion of Gondwanaland; indeed, it is a floating laboratory in terms of continental drift. Rather than an island that has been populated by waifs and strays, it is populated by the direct descendants of a previous era. The picture which is emerging indicates that the total community structure is the same as that of portions of other southern continents — what we are trying to say is that up to the present, most zoogeographers have concentrated on groups without looking at a total ecosystem

which when looked at is directly comparable to those ecosystems found in other southern regions."

The Forsters, who met as students in the zoology lab at Victoria University, Wellington, have collaborated successfully both domestically and professionally. The results: four grown children and four popular introductory books on the zoogeography of New Zealand. Complete with superb photographs, these books, especially *Small Land Animals of New Zealand*, are highly recommended to prospective New Zealand explorers.

Tuatara (Sphenodon punctatus) — a survivor of a prehistoric era that can only be found in the sheltered isolation of New Zealand.

Photo by R. R. Forster.



ERNST MAYR, FIRST YEAR EMERITUS PROFESSOR: PROGRESS REPORT

Retirement . . . a time to reflect, relax, wind down — maybe for some people but certainly not for Professor *emeritus* and former MCZ Director Ernst Mayr whose academic schedule has never been fuller now that he no longer has formal teaching and museum administration to slow down his pace.

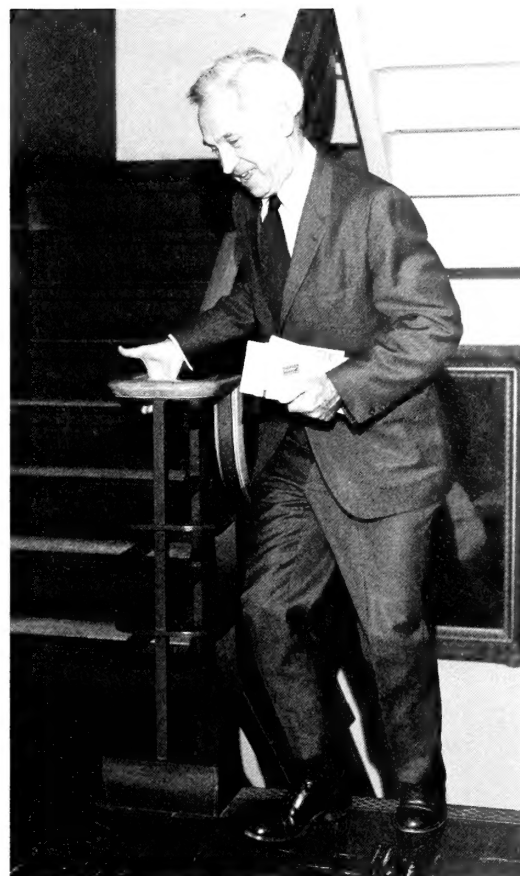
His list of activities for his first year of "retirement" (he officially became Professor *emeritus* in 1975) would wear out many an assistant professor. In between working on two new books on the history of the evolutionary synthesis and the history of ideas in biology, he found time to deliver eleven lectures, serve on ten national committees including chairing the Section on Population Biology, Evolution, and Ecology of the National Academy of Sciences, receive four new honorary memberships and add twelve new publications to his bibliography.

Plans for this year are no less staggering. Having just returned from California where he delivered lectures at the University of California in Los Angeles, Davis, and Berkeley, Professor Mayr will spend a week teaching at the University of Connecticut in mid-November, will attend a December coming-out party hosted by publisher Harvard University Press for his collected essays entitled *Evolution and the Diversity of Life*, and in February will take up six months residence at the University of Würzburg as recipient of the Alexander von Humboldt Award. He will use this opportunity to consult German reference sources for his work on the aforementioned books.

Professor Mayr's "leisure" time is no less active. Together with Mrs. Mayr, a recent weekend was spent chopping wood for the winter on their New Hampshire farm. When asked for his formula for eternal vigor, he has a ready answer: "Keep moving!"

A PHILOSOPHER SPENDS YEAR AT THE MCZ

Physics, according to philosopher Richard M. Burian, has been adopted by most philosophers of science as *the* model science for inquiry into methodological and epistemological standards. Dr. Burian is spending this year at the MCZ, under the tutelage of Professors Ernst Mayr and Stephen J. Gould. He wants to acquire a basic grounding in evolutionary biology in order to understand the basic differences between the two "kinds" of sciences — those that deal with essentially complex systems (biological organisms, terrestrial weather patterns, etc.) and those dealing with relatively simple systems (simple atoms confined in a volume to make up a gas, planetary systems which can

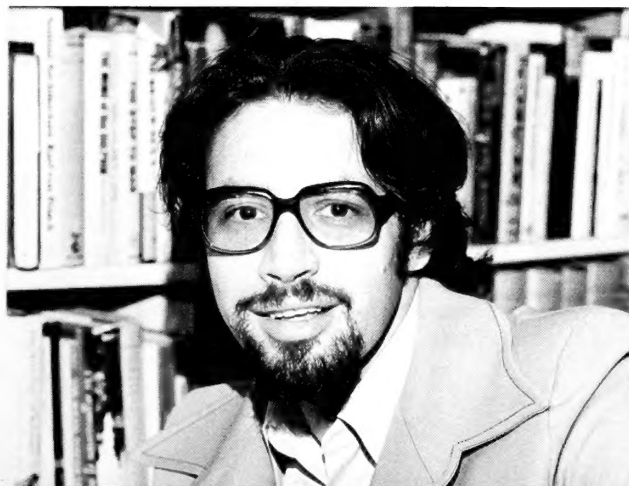


Professor Ernst Mayr, who emphatically avoids elevators, on his daily trip from the mailroom (first floor) to his office (fifth floor).

be treated as if they are composed of point masses, etc.). "If these differences prove significant, philosophers of science must no longer limit their attention to methodologies characteristic of physics" concludes Dr. Burian in his proposal to the American Council of Learned Societies who provided a Study Fellowship for his work.

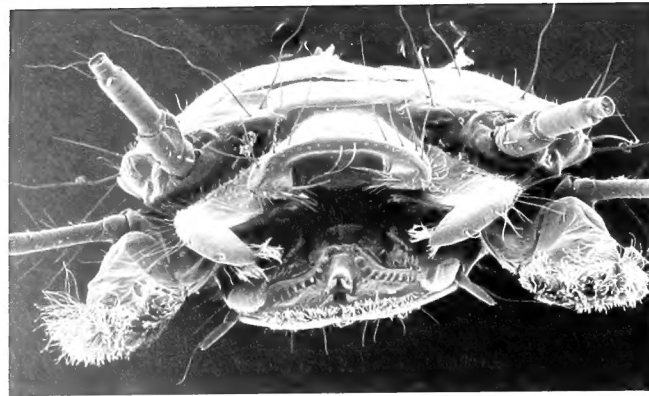
Why did Dr. Burian decide to concentrate on evolutionary biology for this study? "Evolutionary biology provides a most interesting test case for my purposes. If any science deals with essentially complex phenomena, it does . . . Furthermore, recent developments in biology — especially with the spectacular growth of molecular biology — have shown that certain biological problems can be solved by a physics-like approach. Some of these problems overlap in intimate ways with the problems dealt with in evolutionary biology. My problem about the different kinds of science can therefore be clearly epitomized in case studies which exhibit the interplay between competing ways of doing biology."

Dr. Burian, whose past training has concentrated on mathematics and the physical sciences, has taught philosophy for the past seven years at Brandeis University and will join the faculty of Drexel University upon completion of his year of study at the MCZ.



Dr. Richard Burian

HOW TO COMPETE SUCCESSFULLY FOR FOOD — ADAPT!



a) 58x



b) 1,650x



c) 73x

Specimens prepared by Dr. John F. Lawrence

The mouthparts of beetle larvae vary greatly and scientists have made extensive use of these differences to trace their evolutionary history. However, until Dr. John F. Lawrence of the MCZ's Entomology Department started taking a close look with the aid of the scanning electron microscope, the complex role these adaptations play in the never-ending competition for food was largely unknown.

The larval mouthparts on these pages allow their owners to use several strategies to secure and ingest food.

a) The marsh beetle (*Helodidae*) uses the fine comb hairs at the tip of the maxilla (b) to gather small particles in mud which are then brushed past the combs on the floor of the mouth.

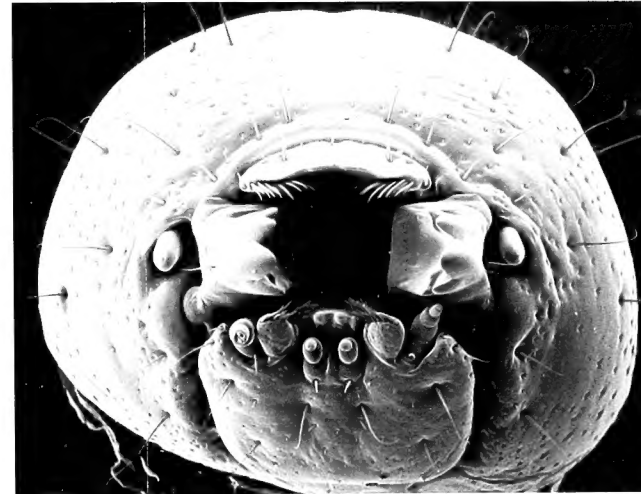
c) The larval mandibles of the fire beetle (*Pyrochroidae*) grind rotten wood and fungi with the molar region in a manner not dissimilar to that used by elephants.

d) The same type of food, rotten wood, is compacted and swallowed whole by this tropical wood borer (*Callirhipidae*).

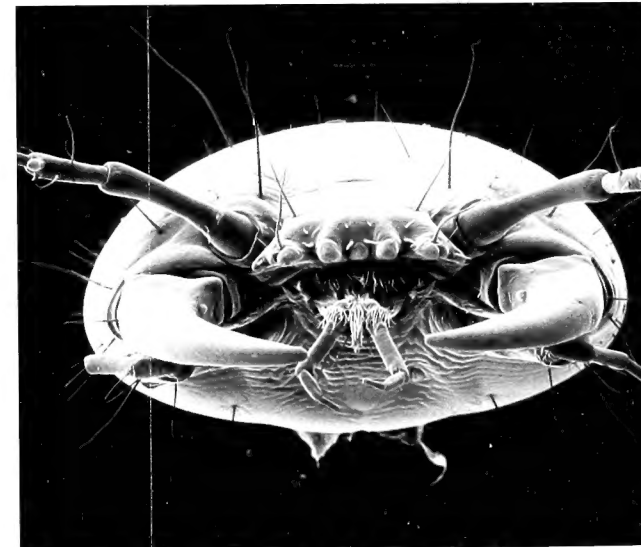
e) The leaf beetle (*Chrysomelidae*) employs serrated mandible tips (f) to scrape the tissue of leaves which is then swallowed whole.

g) The rove beetle (*Staphylinidae*), a predator on various invertebrates, pierces its prey with its sharp mandibles, secretes enzymes which digest the prey outside the body, and then sucks in the liquid food through a strainer composed of hairs at the mouth entrance.

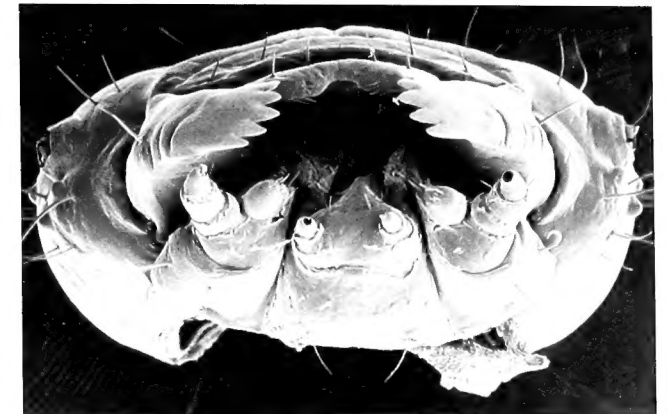
h) The peculiar larva of the Texas beetle (*Brachypsectridae*) which also digests its prey externally, uses its hypodermic-like mandibles to inject enzymes into the spiders on which it feeds.



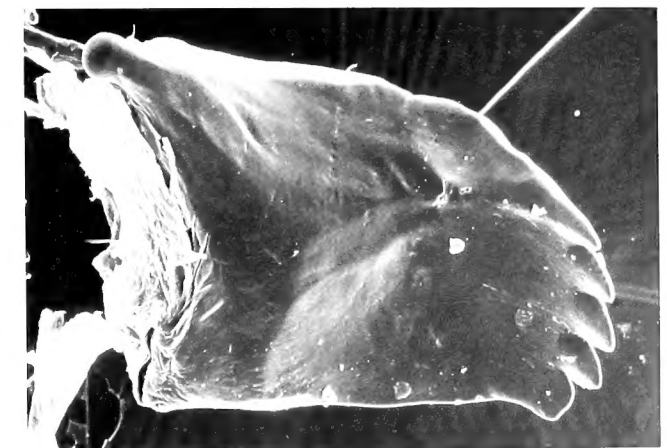
d) 54x



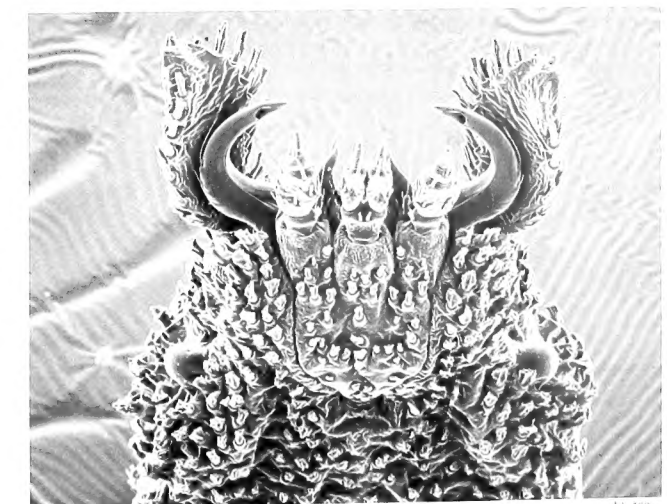
f) 83x



e) 53x



g) 140x



h) 100x

Scanning electron micrographs by Edward Seling

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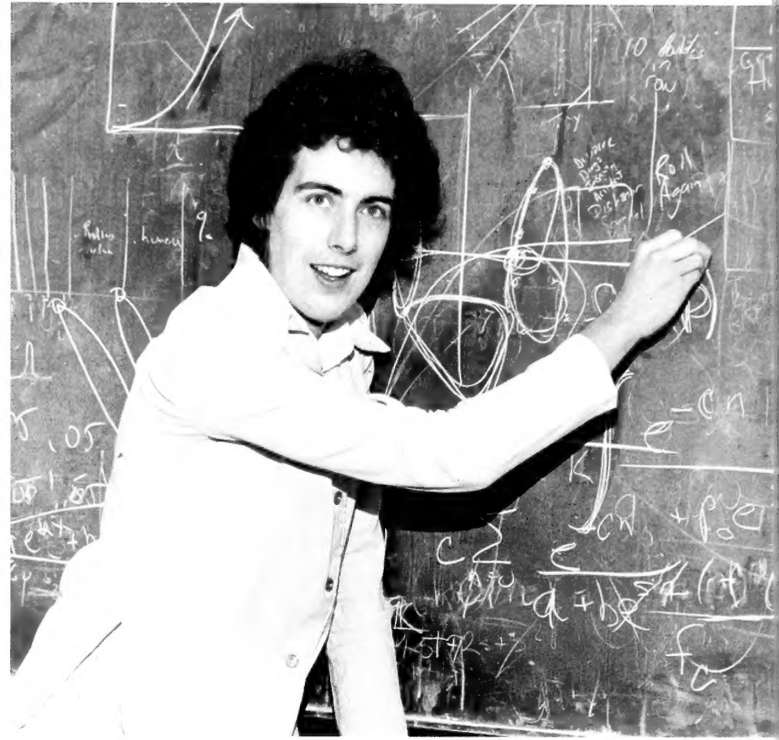
NEWCOMERS

Dr. William Fink

Dr. William Fink, who studied under Stanley Weitzman at the Smithsonian Institution and is now Assistant Professor of Biology (Fishes) here, has a two-fold research agenda for his immediate future at the MCZ as well as an ambitious long-range plan which will take a great deal of organizing to realize. First priority is to continue his study of the evolution and systematics of deep-water fishes. He is now examining their skulls and jaws, having made an extensive study of their postcranial skeletons for his Ph.D. dissertation. The MCZ's vast collections are essential to his work. Next Dr. Fink plans to work on one of the most important of the MCZ's collections — the South American characoid fishes (known to aquarium fanciers as tetras and characins), which were collected on the Thayer-Agassiz expedition of the late 1850's. Several of the fishes in this collection have probably since become extinct.

Dr. Fink recognizes the considerable lack of knowledge of the ecosystems and fish species in today's South American waters and realizes that many of the present day species will also become extinct in the not-too-distant future. Thus his long-range goal is to join with other workers in the field and mount a new collecting expedition to South America. The new collection would be studied and compared with those of the last century. "What we collect today will be invaluable to the student of evolution 100 years from now. That's what is so important about collections like the MCZ's. They are always sitting there waiting for each generation to ask questions of them." Collecting in South American waters presents many challenges, including delicate negotiations with government officials. The actual logistics of collecting are also tricky. Ideally, Dr. Fink would like to be able to plan his collecting strategy and then travel by helicopter, dropping down to sample at predetermined points.

His wife, Sara, who is an excellent illustrator, not only provides illustrations for Dr. Fink's papers, but is now also interested in working on fishes herself.



Dr. Diane Wagener

Schistosomiasis, now considered to be the greatest parasitic disease in the tropics and subtropics, is caused by a complex series of interactions between a fresh water snail and a human. Minute worm larvae, released from cysts on the snail, bore their way through the skin to develop as blood flukes, schistosomes, in the blood vessels of the intestine and urinary tract. The adult worms produce large numbers of eggs which are excreted by the body and later hatch in the water into free-swimming larvae which infect the snails. Severe economic implications of this disease result because of its debilitating effects on the human population.

Dr. Diane Wagener, who received her Ph.D. in genetics from Stanford and has joined Professor Richard C. Lewontin's population genetics group this fall as a National Institutes of Health Postdoctoral Fellow, is interested in, among other things, developing a computer model which will direct researchers to the appropriate lines of inquiry in the attempt to control the disease. (Incidentally, in the process, Dr. Wagener is also becoming an accomplished snail-keeper!) She is also doing theoretical research in population genetics, studying how changes in gene frequency due to selection at one gene locus will affect other gene frequencies of nearby (linked) loci on chromosomes.

Dr. Wagener and her husband, Pete Welch, an economics student, are currently resident tutors at Lowell House. She plans to teach a course on biological mathematics through the Department of Engineering and Applied Physics where she was a Radcliffe Fellow last year.

MCZ RECEIVES HISTORICAL TREATMENT

The MCZ, so long a center for investigations of the natural world, is now itself the object of an investigation. Dr. Mary P. Winsor, on sabbatical leave from the University of Toronto, has a grant from the National Science Foundation to study the history of the "Agassiz Museum". With Ann Blum, MCZ Archivist, as research assistant, Professor Winsor is delving into the material in the Museum's and University's Archives. She explains her work as follows:

"The history of the Museum since its founding in 1859 — the collections, the finances, the personalities of the people who worked here, all should be integrated, I believe, with the history of biology. What scientific work did the building shelter? What use was made of the collections? Louis Agassiz intended his museum to be a fortress against Darwin's just published theory. He devised a plan of exhibits in the hope that the public would be visually struck with the impossibility of evolution. He cherished the Museum's growth and reputation, regarding it as his highest contribution to science . . .

The subsequent history of the Museum of Comparative Zoology offers an excellent opportunity to examine the ways in which 'pure science' is dependent upon an institutional foundation. Not only at its founding, but in all its subsequent development, the Museum was shaped by social and economic factors. At the same time, its staff was pursuing an ideal of science as objective immortal truth. If this research were made the occasion to explore something of the nature of science as it existed, not just as it likes to think of itself, then the story would be of interest to many scientists and historians who have never even heard of the MCZ."

Dr. Winsor asks anyone who knows of any diaries or letters by anyone associated with the Museum to contact her at the MCZ. Surprisingly enough, more information exists for the early years than for the period after Louis Agassiz died in 1873. The records from about 1899 to 1927 are meager, so she would be especially grateful to be told of records of that period. She intends to end her story with the end of Thomas Barbour's directorship in 1946.

Dr. Winsor will be giving a talk to the Friends this winter on this fascinating study.

LECTURE

Knut Schmidt-Nielsen, Professor of Biology at Duke University and a good friend of the MCZ and Concord Field Station, will be giving a lecture at the Science Center (in the Research Lectures for Non-Specialists series) on Wednesday, December 15 at 8:00 in Lecture Hall B. His topic will be: *Scaling: the importance of body size*.

Dr. Schmidt-Nielsen will talk to the Friends of the MCZ next year on the topic of the evolution of natural history study from a qualitative to a more quantitative approach.

Under the watchful eye of Louis Agassiz in the MCZ's Library, Dr. Mary P. Winsor unravels the MCZ's past.



Golda, an Australian opossum, is certainly more attractive than her American counterpart. She is currently contributing data to Professor A. W. Crompton's research on jaw mechanics.



FRIENDS' ACTIVITIES

Fall Film Series

The first film in the joint series with the Boston Zoological Society, *Mzima: Portrait of a Spring*, was rated "superb" by the audience. The other showings in this series include *World in a Marsh* and *Strange Creature: The Echidna* on November 16 (highlighted by a live appearance by Frances, the MCZ's resident echidna) and *Miss Goodall and the Baboons of the Gombe* on December 14 . . . 5:30 p.m. . . . Geological Lecture Hall.

Trip Round-Up

Galapagos — An orientation dinner for the lucky participants in this trip was held on November 3. If this year's expedition turns out as well as anticipated, the MCZ will charter the entire vessel for 1978. Prospective voyagers are encouraged to start saving now!

Baja 1977 — An irresistible ad in the Harvard Magazine has attracted a varied, interesting-sounding group of voyagers for this trip which now has a waiting list. Once again, there is a repeat passenger as well as, of course, repeat leaders. Whale-watching can certainly become habit-forming.

Saturday Morning Children's Programs Planned

In response to requests from many Friends, an introductory eight-week zoology course for 4th to 7th graders will be offered this January. Children of Friends with family memberships will receive priority (and a discount). A descriptive flyer and registration

Friends of the MCZ
Museum of Comparative Zoology
26 Oxford Street
Cambridge, MA 02138

I would like to join the Friends of the MCZ and enclose payment of dues.

Family \$25 _____, Individual \$15 _____,
Student \$10 _____.

Name _____

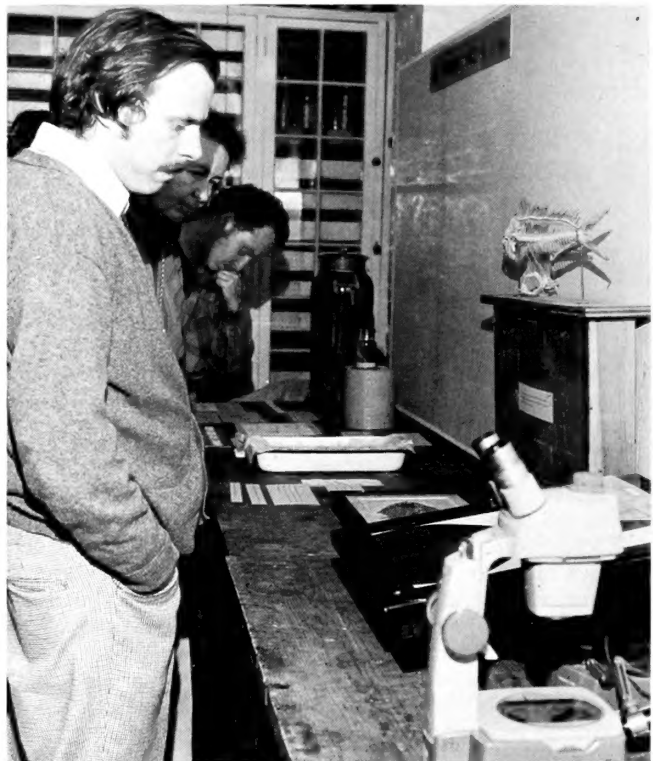
Address _____

Benefits of membership:

- Announcements and invitations to all events including lectures, films, and gallery openings
- Discounts on MCZ courses for the public
- Advance notice of all MCZ trip announcements
- Subscription to *MCZ Newsletter*
- Discounts on Museum Shop purchases and on Museum and Concord Field Station publications

form will be mailed shortly but Friends who are interested are advised to call 495-2463 to get on the list early.

Friends of the MCZ Third Annual Open House



James McConathy, Lorraine Fields, and James Murphy, (l. to r.) view the Fish Department's display, one of the many interesting exhibits at the Open House on October 5th.

PUBLIC EDUCATION PROGRAMS

The State Board of Education has again granted the MCZ funds to conduct courses for students in the City of Boston schools. Under the direction of Peter Walsh these programs, which involve 5th and 6th graders in Studies in the Life Sciences, Animals in Human Culture, and a new curriculum which will culminate in the building of a small museum in two of Boston's "magnet" schools, are receiving a gratifying response from students and teachers.

VOLUNTEER PROGRAM THRIVING

A grant from the Blanchard Foundation has made it possible for Kate Walton to continue the volunteer guide program. An attractive flyer describing the Harvard University Museum Visitor Programs has been printed and distributed to Boston schools. The schedule is filling up and it is now a common experience to eavesdrop on a guided museum tour when walking through the third floor public exhibits area.